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The Impact of Internal Migration on Labour Market Outcomes of Native Males in Thailand[1]

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Abstract

We investigate the impact of internal migration on local labour markets in Thailand. Using an instrumental variables approach based on weather and distance we construct an exogenous measure of the net migration inflow into each region. Our econometric results show that instrumenting for the possible endogeneity of net inward migration is crucial to the analysis. The results suggest substantial adjustments in hours worked and weekly wages in response to short term changes in labour supply for low skilled males.

Key-words: Internal migration, Labour markets, Thailand

JEL-Classifications: O15, J10

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I. Introduction

The 2009 Human development Report (UN 2009) estimates that at least 740 million people worldwide are internal migrants, i.e., almost four times the number who have moved internationally. Despite this, perhaps because movements within borders often go undocumented, the literature on internal migration and its consequences on local labour markets is much smaller than the voluminous literature on international migration.[2] In this regard, a key difficulty in measuring the impact of internal migration is the endogeneity of migration flows. More precisely, net migration is likely to be correlated with economic conditions in each region making it difficult to identify the impact of migration on variables, such as the wage and employment level, which also depend on such factors. In this study we use exogenous climatic shocks to identify the impact of internal migration on labour market outcomes at destination provinces in Thailand.

In particular we analyse the effects of inter-provincial migration on wages and employment in Thailand using the Thai Labor Force Survey for the period 1991-2000, a rich data set that allows us to identify semi-annual migration flows between Thai provinces[3]. Our main contribution relies on the fact that, in contrast to previous studies that have focused mainly on employment probabilities and on income or hourly wages, we investigate the impact on weekly wages and hours worked. Arguably the focus on weekly wages and hours worked could be crucial since examining only hourly wages or weekly wages ignores the potential link between remuneration and hours worked. Many previous studies focus on a single measure of earnings, hourly, weekly or perhaps daily or annual without explicitly

[2]See Lucas (1997) or Mendola (2012) for reviews of the literature on internal migration in developing countries, or De Brauw et al. (2014) for a review of the literature on urban rural migration in Sub-Saharan Africa.

[3] We focus on males because employment rates are much higher than for females and because for the latter estimation is further complicated by needing to model the labour supply decision.

considering that hours may vary[4]. This may be an important omission. For example we will see in this study that there are no statistically significant effects of inward migration on the hourly wage of natives but substantial effects on weekly wages, driven by a reduction in hours.

The large literature on migration and it's impact tends to implicitly assume that hours per worker are fixed or do not explicitly consider variation in hours. It may well be that sometimes this a reasonable assumption. In some cases there may be little variation in hours in response to migration[5]. We show here though that for the Thai case this is not so, implying that it is always important to check.

In a standard competitive model with fixed hours, if we assume labour supply is inelastic, a shift in labour supply induces a fall in wages of substitute workers and the percentage change in wage from a percentage change in labour supply is just the inverse of the elasticity of labour demand[6]. The standard competitive model where hours are variable is a little more complicated. The firm's production function depends on both the number of workers and hours per worker while the workers labour supply decision is based on a wage hours bundle rather than just the wage. This model originally developed by Lewis (1969) is the precursor of the compensating differentials model and equilibrium is a set of tangencies in wage hours space between worker's indifference curves and the firm's isoprofit curves. Kinoshita (1987) develops the comparative static properties of this model and Strobl and

[4] For example if we look at recent studies that look at the impact of internal migration Kleemens and Magruder (2014) look at employment and income per hour but do not analyse weekly hours, Maystadt et al. (2014) look at the employment probability and monthly income. Prominent studies which look at international migration such as Aydemir and Borjas (2007) look at annual, monthly and weekly income and the share of weeks worked, but not weekly hours while Ottaviano and Peri (2012) similarly focus on wage changes without considering hours explicitly and Friedberg (2001) considers the impact of a large influx into the Israeli labour market on hourly wages of natives.

[5] Indeed it may well be that the authors of the studies checked for variation in hours and did not report this if there was little variation.

[6] See Borjas (2013) for a recent very clear exposition of the analytics of the model with fixed hours.

Strobl and Walsh (2011) use a simplified version of Kinoshita's model with homogeneous workers and firms to analyse minimum wages and hours worked. In this simple model the number of workers supplying labour and the number of workers demanded at the market level is a function of the level of worker utility which as noted above depends on both the wage and hours. For this reason we can no longer think of an estimate of the hours elasticity from a change in migration as the inverse elasticity of demand for workers as in the simple case where hours are fixed. Of course this does not mean that we cannot compare our estimates of the elasticity of hours from a change in migration with those from other studies, we do this in the results section below. Rather that when we look at the results from this paper where we will see that hours per worker clearly do vary substantially, the underlying theoretical model we would use to understand the results would be different to the way we would interpret estimated elasticities in a model with fixed hours.

To isolate the impact of migration on hours worked and weekly wages in Thailand we focus on short term supply shock induced movements of labour between provinces. More specifically, using the methodology developed by Boustan et al. (2010) and similarly employed in a developing country context by Strobl and Valfort (2015) and Maystadt et al. (2014). This approach explicitly relies on exogenous variation in weather between provinces to construct arguably plausible instruments for inter-provincial migration flows that take into consideration the geographic distance between sending and receiving provinces. The underlying rationale rests on the fact that, particularly in developing economies, weather conditions might induce a spatial reallocation of the relatively mobile input labour.[7]

[7] For instance, Yang and Choi (2007) examine how remittances sent by migrants respond to income shocks experienced by Philippine households. The authors use rainfall shocks as instrumental variables for income changes and show that, in households with migrant members, exogenous income declines are partially covered by foreign remittances. More particularly, households with migrant members enjoy a flat

Arguably, Thailand, in particular during our sample period, constitutes an ideal case study for the task at hand. Standards of living, economic and cultural structures, and growth rates differ widely among provinces, while the labour market tends to be flexible and is generally characterized by very low unemployment rates. Additionally, climate in Thailand is dominated by tropical monsoons and high temperatures that vary widely across space and time.[8] Moreover, Thailand is one of the earliest Southeast Asian economies to implement an export-led growth strategy, the consequence of which is an increase in rural-urban migration, especially to the service sector in Bangkok (Guest 2003). These factors set the context for potentially large amounts of internal migration within the country, particularly, since, as noted by Guest (2003), migrants in Thailand benefit from good transportation links and well-established social networks that result in migration being low cost. As a matter of fact, the National Migration Survey of Thailand (Chamratrithirong et al. 1995) and the Thailand migration report (2011) showed these labour movements to be indeed substantial. One may want to note in this regard, that while seasonal migration from rural to urban areas is an important element in this and tends to swell the population of Bangkok during the wet season, there are also substantial flows across all regions and in both seasons as we will show below. Additionally, Chalamwong (1998) points out that, after the 1997 economic crisis, return migrants tended to head back to the poorest region of the country, the Northeast, followed by the North, the Central and the South regions. There is also evidence of the absorptive capacity of return migrants from urban areas to rural farm activities (Chamratrithirong 2007). However, despite the 1997 crisis, which may have altered

consumption path compared to households without migrants for whom consumption responds strongly to income shocks.

[8] For example, the Southwest monsoon, which starts between May and June, states the beginning of the rainy season and lasts to October. The dry season is shorter in the South and rainfall varies significantly from one region to another depending on latitude and landforms. The Northeast region, with a longer dry season and a laterite soil, has a limited agricultural activity.

migration patterns for seasonal and short-term workers, there have been no signs of a slowdown in the rates of internal migration.[9]

The remainder of the paper is organized as follows. In the next section we review the literature. Section three outlines our data set and section four presents the empirical specification and econometric results. The final section concludes.

II. Review of the literature

II.1 Literature on effects of migration on labour market outcomes

The literature on the impact of international migration on labour markets can serve as a first indication of what effects one might expect from internal migration. For example, well known studies such as Card (1990) looked at the impact of exogenous regional migration shocks like the 1980 Mariel boatlift and found that migration had little impact on native wages. Critics argued that a possible cause for the absence of any observed effect of migration on natives is that natives might move to other local labour markets in response to an influx of migrants, thus masking the impact of migration on wages and employment. While some studies such as Aydemir and Borjas (2007) use national data to overcome this problem and find a negative effect of migration on wages, Aydemir and Borjas (2010) note that "… *the national labour market approach may find itself with as many different types of results as the spatial correlation approach that it conceptually and empirically attempted to replace*[10] ." An alternative explanation for the absence of important effects on wages and

[9] More particularly, the seasonal migration from the northeast of Thailand, facilitated by wide networks of friends and relatives, has continued on a large scale (IOM 2008). This form of migration represents the main source of remittances for out-migration regions. However there has been a slowdown in seasonal migration during the nineties as agricultural workers who migrate to urban areas for temporary employment tend to stay year-round (Chalamwong 1998).

[10] Some examples of studies that have examined this question with mixed results are Bonin (2005) who reports a very weak impact of supply shifts on wages in Germany. Bohn and Sanders (2007) find a weak wage effect on the Canadian labour market. Aydemir and Borjas (2007) use data from Canada and Mexico and find a strong

employment prospects for natives from an increase in migration is that native and migrant workers may be imperfect substitutes (Manacorda et al. 2006; Ottaviano and Peri 2012; Peri 2011). In particular Manacorda et al. (2006) suggest using U.K. data that, while migrants and natives are imperfect substitutes, migrants are close substitutes for other migrants so that an increase in the stock of migrants lowers the wages of existing migrants but has little impact on natives. Arguably, however, internal migrants will be closer substitutes for native workers than international migrants so that these effects are less likely to be as important for interprovincial migration within Thailand. Card (2009) concludes that, for high school dropouts, natives and migrants are perfect substitutes but natives and migrants are imperfect substitutes within higher skilled groups. This conclusion is consistent with the results we present below where we find labour market effects for low skilled workers only[11].

The empirical literature on the effect of internal migration on local labour markets in developing countries[12] tends to show that that an increase in inward migration has negative effects on natives, but there is substantial heterogeneity in the results in terms of who is affected and whether the effect is on wages or employment probability. It may be that poor infrastructure, as suggested by Strobl and Valfort (2013), or other institutional barriers in developing countries restrict capital mobility or firm entry and exit and make the effects of migration on natives more negative. In this regard Kleemens and Magruder (2014) use weather shocks to model internal migration in Indonesia and find effects on wages when migration is instrumented is instrumented, but no effects for OLS estimates. These

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negative relationship between wages and supply shifts induced by immigration while Mishra (2007) studies the Mexican labour market and finds a significant positive effect of emigration and wages in Mexico.

[11] In a recent reappraisal of the impact of the Mariel boatlift Borjas (2015) presents evidence that there are indeed substantial negative wage effects on native high school dropouts from this large influx of largely low skill Cuban migrants into Miami in 1980.

[12] There is also a small literature on internal migration in developed countries. See, for instance, Ham et al. (2011), Berker (2011), and Kennan and Walker (2011), to name a few.

statistically significant effects are concentrated on low skill natives[13]. Strobl and Valfort (2015) use variation in the weather to model net internal migration in Uganda and find that migration reduces employment, especially when road networks are poor. Maystadt et al. (2014) examine Nepal, where the range of push and pull factors used to model migration inflows and outflows across regions includes weather, but also historical migration trends, measures of civil unrest and of environmental degradation, and show that inward migration leads to lower wages for formal sector natives and a loss of employment and rise in unemployment for lower skilled natives. Dillon et al. (2011) provide evidence that internal migration in Nigeria has an insurance element in that it increases with the risk of adverse weather events. Analysing inter-provincial migration and inequality during Vietnam's transition Phan and Coxhead (2010) analyse find that the impact of migration on inequality can be either negative or positive, while Beals et al. (1967) study the migration phenomenon in Ghana and show that income differentials drive migration and that regions of large population are relatively more attractive. Sahota (1968) finds that internal migration in Brazil is highly responsive to earning differentials and inversely related to distance. More generally, economic costs and returns dominate the behaviour of migrants. In a paper that is related to the analysis here, Yang (2004) studies the link between migration and cross-province inequality in Thailand and finds a significant effect of migration on income inequality. More particularly, she reports that a 1 percent increase in the mean fraction of out-migrants to Bangkok entails a 0.058 reduction in the average ratio of Bangkok's income to all other provinces.[14]

[13] Kleemens and Magruder (2014) also look at the difference between formal and informal workers where informal workers are not constrained by the minimum wage.

[14] Vanwey (2003) analyses the role of land ownership in rural temporary migration in Thailand.

II.2 Literature on hours worked and wages:

Lundberg (1985), using Granger causality tests, rejects that wages of low-income married males are exogenous to hours and concludes that hours and wages respond positively to each other although the effect of hours on wages is small. Biddle and Zarkin (1989) estimate a simultaneous model of wages and hours for males and find that wage rates increase up to a certain point, at which point they begin to decrease. In contrast, the taxation-labour supply literature argues that the hourly gross wage is independent of hours whereas the net wage is decreasing in hours (Rosen 1976; Burtless and Hausman 1978; Arrufat and Zabalza 1986). When examining most labour markets and their various institutional features, Vella (1993) explains the negative relationship between weekly hours worked and the gross hourly wage rate by the fact that employers and employees avoid taxation by substituting wages with non-taxable benefits as the total weekly wage increases.

II.3 Using distance as a determinant of migrant destination choice

Taking account of distance in measuring how such weather variation will affect migration between provinces is grounded on the arguments that distance constitutes an important determinant of the location choice of migrants. As a matter of fact, Bryant and Rukumnuaykit (2007) used distance from the Myanmar border to instrument migration from Myanmar to Thailand and find that migration reduces wages of Thai workers.[15] Using the constructed instruments for Thailand we find that inward migration has a substantial negative impact on weekly wages of low skill male natives, but this results from a reduction in weekly hours rather than the hourly wage rate.

[15] See, for instance, Sjaastad (1962), Sahota (1968) and Schwartz (1973).

III. Data and Sample Selection

We use data on males from the Thai Labour Force Survey between 1991 and 2000. The survey is conducted several times a year, with increasing frequency in more recent years. We have access to the February and August surveys for each year. The survey is a large cross-section where, for example, the February 2000 survey interviews over 164,000 individuals, providing a wide variety of information on location, employment status, job characteristics, and income, as well as demographic characteristics. One may want to note that August is in the middle of the wet season in Thailand, while February is at the beginning of the dry season. In this regard, Chamratrithirong et al. (1995) note that "The highest levels of seasonal migration occur during the dry season months of February to May when farmers look for temporary work to tide them over until the next planting season". On the other hand one might expect the demand for agricultural workers to be higher in the August round, so that there may be differences in returns to migration across seasons which reflect both supply and demand factors.

There are seventy two provinces in Thailand as shown in Figure 1. In addition to providing the name of the province where they live, individuals answer the following question: "How long have you been living regularly in this village/municipality?". Respondents can chooses from answers from less than a year, one year, two years, up until nine, and more than nine years. We calculate the number of recent arrivals as those who answer less than or equal to one year. This represents 52.4% of total movers to new provinces.[16] We use this subsample of movers to compute the inflow and outflow rates. We then define the province of origin and the destination province of all movers as people are asked "Which is the previous province of your residence before moving here?". The survey

[16] Note that the category of movers within provinces represents 29% of all movers and that 49.4% of the sample of movers from this category moved one year ago at most.

then asks for the reason of migration. In this regard, among recently moved people, some 35.71% were looking for a job or occupation, 7.62% of respondents migrate for further study, 22.75% follow their family, 28.53% report coming back to their former residence, and 0.22% of migrants state moving from one province to another in order to be nursed. Concerning the province of destination, Bangkok accounts for the largest proportion of arrivals with 7.2% of total recent migrants.[17] We construct a sample of non-migrants residing in the 72 Thai provinces, where we exclude people who moved within the same province. Table A3 presents the share of incumbents and migrants by region, skill group, season, period and residence area type.

For the regression analysis, we reduce the sample to men aged 15-64 who were not attending school at the moment of the survey and who work 95 hours or less.[18] There are three categories of workers: employees, self-employed in business and self-employed in agriculture. These are treated as mutually exclusive in the data in that an employee is not asked the questions on self-employment while a self-employed in business worker is not asked the employee questions. For employees the earnings questions asks workers if they are paid hourly, daily, weekly, or monthly and what the rate of pay is for the relevant category. Table A1 gives summary statistics and shows that 99% of employees are paid either daily or monthly. Most waged workers at the low skill end of the labour market are paid daily, where we define low skill as those with less than secondary education. We drop employees in government or public service workers as well as employees who are in unpaid jobs. After controlling for missing values, the sample used in all the wage and hours

[17] The second best destination province is *Udon Thani* with 4.26% of total recent migrants.
[18] We focus on males to avoid the sample selection issues associated with females who have lower participation rates.

regressions below consists of 194,410 for observations. Low skilled workers account for 130,049 of these.[19]

Self-employed workers in either agriculture or business are asked the net monthly profit from the enterprise in the previous month and also the number of household members who work in the enterprise. Apart from the difficulty in assessing net-profit which is likely to contain substantial measurement error, we do not have any way of knowing how the net profit is distributed across household members. We construct the individual monthly wage by dividing the monthly net profit by the number of household members involved in the business, i.e., we assume that profit is distributed equally across workers in the household. This is also likely to introduce substantial measurement error. We use this to construct a weekly wage from self-employment in agriculture or business. Hours worked data are available at the individual level and we use this to construct an individual hourly wage. We should stress that the hours worked data for self-employed workers is collected in the same way as for employees and is not subject to the same measurement problems as self-employed wages/profits.

Tables A1 and A2 in the Appendix provide summary statistics separately for the subsamples of employees, self-employed in agriculture and self-employed in business. As can be seen, weekly wages are higher for natives than for migrant employees. At the same the former work marginally less hours per week. If one examines remuneration for the self-employed one finds that native self-employed in business earn the highest while migrant agricultural self-employed earn the lowest, in fact multiple times less than the former. Working hours differ little between the various self-employed, except for native self-employed in agriculture who work a few hours less than the other groups.

[19] High-skilled persons are limited to those with an educational level beyond the secondary level.

IV. Econometric Analysis

IV.1 Construction of Instruments

In order to construct instruments for migration we follow the methodology proposed by Boustan et al. (2010), which consists of predicting the total outflow (inflow) from a province induced by weather shocks, and then decomposing this outflow (inflow) into destination province by estimating the role of geographic distances in determining inter provincial flows. We then use both weather and distance to construct the predicted inflow (outflow). More specifically, for the case of migration inflow this first involves regressing total outflow rates of each province on a set of climate determinants:

$$Orate_{i,t-1\to t} = \alpha + \delta' Z_{i,t-1} + \varepsilon_{i,t} \tag{1}$$

where $Orate_{i,t-1\to t}$ is the outflow rate from source province i over time period $t-1$ to t, Z is a vector of climate specific indicators, and ε is an error term. Using the estimated coefficients from (1) the predicted flow of migrants leaving each region i, $\tilde{O}_{i,t-1\to t}$, is then just equal to the predicted outflow rate, $\bar{O}rate_{i,t-1\to t}$, times the population at $t-1$.

$$\tilde{O}_{i,t-1\to t} = \bar{O}rate_{i,t-1\to t} * Population_{i,t-1} \tag{2}$$

One then separately for each sending area *i* regresses the actual set of destination specific outflow rates to each destination province *j* on their relative distances and it's squared and cubic value[20]:

$$Orate_{ij,t-1\to t} = \alpha_i + \theta_i Distance_{ij} + \theta_i Distance_{ij}^2 + \theta_i Distance_{ij}^3 + \mu_{i,t} \tag{3}$$

The instrument for in-migration to province *j* , $\bar{\bar{I}}_{j,t-1\to t}$, is then just the sum of the predicted number of migrants over all areas ($i \neq j$), $\bar{O}rate_{ij,t-1\to t}$ expected to settle in province *j*:

[20] One should note that Boustan et al. (2010) regress these rates only on distance and its squared value. For the case of Thailand we found that including its cubic value substantially increased the specifications fit.

$$\bar{\bar{I}}_{j,t-1\to t} = \sum_{i=1,\cdots,n\ (i\neq j)} \tilde{O}_{i,t-1\to t} * \bar{O}rate_{ij,t-1\to t} \quad (4)$$

One can then in a similar manner construct predicted outflow from area *j* by predicting the in-migration rates to each receiving area *i* using climatic determinants, using these rates to predict the number of inflowing migrants into *i*, and then constructed predicted outflow migrants by multiplying this figure by the distance and its non-linear terms estimated inflowing rates between provinces *i* and *j* ($i \neq j$).

In order to estimate (1), as well as its analogous specifications for the in-migration, we use for the vector *Z* a number of measures that capture weather conditions in a province. In order to identify periods of extreme wetness and dryness in provinces we first calculated the local standardized precipitation index (SPI), which has been argued to be particularly good at capturing the cumulative effect of high and low patterns of rainfall over time in a chosen locality, from the mean monthly precipitation values within our provinces as calculated from the IPCC data set.[21] Following McKee et al. (1993) we then define a monthly extremely dry (wet) event as starting when the SPI reaches an intensity of -2.0 (2.0) or less (more) and as ending once the index become positive (negative) again. For each time period we then calculate the number of months of extreme dryness (wetness). The corresponding constructed variables are DRY and WET, respectively. To capture the effect of temperature, in particular with respect to its importance for agriculture, we construct a measure of reference evapotranspiration (ET) to represent the evaporative demand of the air within a basin. Following Hargreaves and Samani (1985), evapotranspiration is calculated as:

$$ET = 0.0023(T_{avg} + 17.8)(T_{max} - T_{min})0.5R_a \quad (5)$$

[21] The calculation of the SPI is based on modelling the probability distribution of precipitation as derived from long term records by fitting these to a gamma distribution via maximum likelihood. An important component in this regard is the chosen time scale. Since we are interested in cropland productivity and soil moisture conditions are known to respond to precipitation anomalies over a relatively short time period, we use a 12 month scale.
See http://www.drought.unl.edu/whatis/indices.htm.

where T_{avg}, T_{max} and T_{min} are mean, maximum and minimum temperature, respectively and Ra is the extraterrestrial radiation calculated following Allen et al. (1998). Since the effects of rainfall shortages and abundance on local agricultural are likely to some extent to depend on the local evaporative demand, we also allow for interactions between ET and WET and DRY. To construct all these climatic factors at the provincial level we resort to information from the Inter-Governmental Panel on Climate Change (IPCC) climatic data set, which provides monthly precipitation and temperature measures across the globe at the 0.5 degree level over the entire 20th century. We use these to calculate out time varying averages within provinces.

The results of estimating (1) for the annual provincial out- and in-migration rates, controlling for provincial specific fixed effects and provincial common time specific factors are given in Table 1a. We calculate Driscoll and Kraay (1998) standard errors corrected for spatial and temporal correlation throughout. As can be seen, for both of inflow and outflow rates, the set of climatic variables are almost all significant, producing highly significant F-tests of joint significance. Examining the individual factors, one finds that for the precipitation related factors the signs meet a priori expectations. More specifically, one finds that extremely dry as well as extremely wet weather, indicative of drought and flood like conditions, respectively, act to increase overall outflow from regions. In terms of economic significance, the estimated coefficients imply that one month of dry (wet) weather would increase the outflow rate by 7.9 (10.5) percentage points. Moreover, the negative impact of rainfall shortage is further exacerbated by a high evapotranspirative demand of the air. Somewhat surprisingly, the direct effect of evapotranspiration is to reduce outflow from a province, although in absolute terms this impact is small. For the inflow rate, one finds that extremely wet periods tend to reduce the inflow rate, while droughts have no significant effect. Using the estimated coefficients indicates that one month of extremely wet weather would decrease the inflow rate by 0.7 percentage points. Furthermore, we find that a high evapotranspirative demand of the air tends to reduce the effect of the latter. Surprisingly one finds that this demand on its own acts to increase person flowing to the province, although again not substantially so. To construct the predicted inward and outward migration rates by sub-group we proceeded in similar manner as for the overall sample, except restricting construction via (1) through (4) to the sub-sample in question. We report the estimation for (1) for the outflow and inflow rates in Tables 1b and 1c, respectively. As can be seen, for the outflow rate all climatic variables are significant, where the signs are in congruence with the overall sample. Unsurprisingly the joint F-tests attests to their power as predictive factors. For the inflow rates, the majority of coefficients are significant and similar to those from the overall sample. Similarly, the F-test statistics provide evidence of their predictive power.

In terms of estimating (3), since this involves estimating different specifications for each province, we only provide a brief outline of the results. One may want to first note that since our distance measures do not vary over time, our estimated specification in (3) does not control for province specific effects, but does include a set of time dummies to control for common region time specific factors determining the migration flows. We used Driscoll and Kraay (1998) standard errors corrected for spatial correlation as we did for (1). For each province specific regression, we, after estimating the parameters on distance conducted an F-test of the null hypothesis that these were jointly zero. In the case of out-migration rates for only 4 provinces, while in the case of in-migration rates for only 6 could the null hypothesis not be rejected. As with the overall sample the F-test of the distance variables suggested strong predictive power in almost all cases for the estimation of (39) for subgroups. Finally, we depict the average relationship between distance and inflow and outflow rates in Figures 2 and 3, respectively. As can be seen, the shape in general suggests a non-linear decreasing relationship between the rates and distance, where the marginal change is high at very short and very long distances.

In Table 2 we report the results from the first stage regression of our IV specifications where we use predicted migration rates constructed as outlined above to predict actual net migration rates. Table 2 shows the results for men by skill. As can be seen, and is indicated by the F-Test on the instruments, the predicted inflow rate variables significantly predict an increase in actual net migration, whereas predicted out-migration rate acts to decrease net migration. Using bootstrapped standard errors and the corresponding Wald tests show similar results although standard errors are somewhat larger. A notable feature of Table 2 is that if anything migration flows are a little larger in the high skilled group.

Table 3 provides average actual and instrumented inflow and outflow rates by broad region and season for the subset of the population who are in employment. Looking at the actual flows one can see that while there is considerable variation across region, flows from Bangkok are the highest over our sample period. Instrumented flows predicted by weather changes are much smaller than the actual, where predicted inflows and outflows are symmetric as we would expect for migration associated with random shocks across provinces. One may also want to note that the instrumented flows are much smaller in Bangkok than other regions. We use the binary variable which asks participants if they live in a municipal area as a proxy for urban or rural area and provide in Table 4 the average flows decomposed by this urban-rural proxy. Accordingly, actual outflows are a little higher in municipal (urban) areas compared to non-municipal ones, but there is no difference in inflow rates. Similarly there is no noticeable difference in the predicted inflow or outflow rates by urban-rural status.

Tables 3 and 4 also provide the flows across the high and low season and indicate that there is no noticeable difference in inflow or outflow rates across seasons. In general the tables suggest substantial flows of recent migrants and that these flow across most regions and are not dominated by seasonal or urban/rural migration. While our prior would have been that in particular migration flows generated by weather shocks would generate larger rural urban flows in particular it may be that weather conditions also have implications for labour demand in urban sectors such as tourism or construction etc. Table A1 summarises the distribution of workers across broad occupation groups by migrant status. The results are consistent with the finding that migration flows are not especially dominated by seasonal urban rural migration. The occupation category *Farmer/Fisherman/Hunter* accounts for about 12.6 per cent of natives but only 8.8 per cent of recent migrants and there is a similar breakdown for the industry category *Agriculture, Forestry and Fishing*. While migrants account for 11 per cent of employees, they account only for 5 per cent of self-employed workers in agriculture or business (Tables A.1 and A.2). In other words it appears that most migrants are working as employees in non-agricultural jobs and are less likely than natives to be in these jobs.

Another notable feature from Tables 3 and 4 is that there is no noticeable difference in inflow and outflow rates from weather shocks, by skill level. In this regard, one might have expected that weather induced migration would be higher for low skill workers given that their employment is likely to be in low skill manual occupations that might be more affected by the weather. Of course, on the other hand, higher skilled workers may be more mobile where there is often a selection effect in that higher skill workers are more likely to move.

However, one should bear in mind that the cut-off for high skill is not very high, so that there may be substantial numbers with more than elementary education in manual jobs who are categorised as high skill but whose skill level is not that high. We do conduct some robustness tests with alternative skill measures in our regression analysis below but as we move up the skill distribution sample size falls substantially in the high skill group. Given this arguably our results are more convincing for the low skill group since we can identify a large sample of workers with very low educational attainment while attainment in our "high skill" group is more dispersed.

IV.2 The Effect of Net Migration on the Local Labour Market

We next examine the impact of net inward migration on the log weekly wage, weekly hours and log hourly wage for males of working age (15-64) controlling for individual characteristics. In particular when we look at the impact of migration on the log wage we control for age and age squared, marital status (four dummies indicating single, married, widowed or divorced status), a dummy indicating whether the worker lives in a municipal area and a set of twelve educational indicator dummies. For our sample of private sector employees we also include ten occupation dummies, ten industry dummies, seven firm size dummies, dummies indicating whether the worker is paid hourly, daily, weekly or monthly. Additionally, we include average age and the fraction of workers with no education at the province level as well as province and time specific effects in all specifications for employees and self-employed in business or agriculture.

The results on the estimated coefficient on the net inward migration rate for the log weekly wage and weekly working hours are reported in Tables 6 to 9. In Table 6 in the first column the coefficient of -0.059 on log weekly wages in the OLS results for all males indicates that a 10 percentage point increase in the net migration rate (which means the population increases by 10% due to net migration) is associated with a decrease in male wages of about 0.6%. A clear worry here is that, as noted earlier, we might expect migration inflows to depend on local economic conditions which also affect the wage level or level of hours worked. For example, in terms of a simple competitive model an increase in labour demand in any province would be expected to increase inward migration and labour supply but also wages in that province. On the other hand, inward migration and labour supply in any province will also increase due to changes in demand or supply conditions in other provinces and thus lead to a fall in wages. In other words, the theoretical predictions from regressing un-instrumented migration flows, which are a mixture of supply and demand effects, on wages are unclear. As a matter of fact, the results from the instrumental variables regressions discussed below confirm that this worry is legitimate. More precisely, taking account of the endogeneity of migration one finds that the weekly wage decreases by 3.5% when migration increases the population by 10 percentage points.

Examining the effect of migration on hours worked we report the coefficients on hours from the OLS and IV regressions on hours worked, one finds that while OLS results produce a small insignificant coefficient, the instrumental variables model suggest that a 10 percentage point increase in population due to migration lowers weekly hours by about 1.07 hours. We also report the percentage change in hours implied by the IV estimates in the regression tables[22]. For these IV estimates the estimated coefficient implies a percentage reduction of just over 2 percent in hours from an increase in population of 10 percent, although we note the underlying coefficient is only statistically significant at the

[22] The regression coefficients on hours report the change in hours from a ten percentage point increase in the population. To convert this into an elasticity evaluated at the average level of hours we divide the coefficient by the average hours of the sample.

ten percent level. We supplement these results with the results from Table 10 which reports the effect of migration on the probability that a worker wishes to work longer hours in the previous week using a linear probability model. In this regard, if inward migration were associated with an increase in the probability that the worker wishes to work longer hours, this could be viewed as being consistent with the evidence in Table 6 that migration reduced hours worked as well as suggesting that this reduction in hours was involuntary. We see that for both the OLS and instrumental variables specifications a 10 percent increase in population increases the probability that an incumbent wishes to work longer by 0.8 of a per cent and 2.4 percent respectively, although the larger coefficient for the instrumented specification is only significant at the 10 percent level.

Table 6 also provides results by high and low skill group. Here we find that there are no statistically significant effects for the high skill group apart from a marginally significant fall in the hourly wage in the OLS results. In contrast to this we will see throughout the remainder of the results that there are clear effects for low-skill migrants. In this respect, as noted earlier, the predicted migration flows are very similar across skill groups suggesting that weather induced migration is not primarily low skilled. As a matter of fact, the literature on international migration often shows that migrants tend to be more highly educated in a given occupation compared to natives so that there is a disproportionately high share of high skill migrants in lows skill occupations (see, Walsh, 2013) for example].[23] If this were true for Thailand then one might observe high skill migrant flows where these migrants compete for low skill jobs at their destination and only affect the wage and hours outcomes in low skill sectors. To further examine this, Table 5 depicts the share of high skill workers in each occupation category by migrant status, but there appears to be no evidence

[23] See, Walsh (2013), for instance.

of this effect. Rather the share of high skill across occupation groups is broadly similar and not noticeably higher for migrants in low skill occupations. Perhaps this is because the differences between internal and international migrants are small so that migrants can find jobs in line with their skill. In terms of explaining why it is that the effects we find in Table 6, and indeed for most of the paper, are more pronounced for low skill workers, it may be that given that the summary statistics in Table 5 indicate that high skill and low skill migrants are not typically competing for the same types of jobs the nature of the technology may different for high skill employees. For example, one would expect on the job training and job specific skills to be more important in high skill jobs so that wages and hours are set in longer term contracts so that the responses to short term labour supply shocks are smaller. Also as we noted earlier and discuss in more detail below the absence of statistically significant effects for high skill may partly reflect the possibility that our categorisation of high skill implies that the high skill sample will possibly include substantial heterogeneity in skill levels.

The results for low skill workers In Table 6 show that the OLS coefficients are all statistically insignificant while the instrumented regressions predict that a 10% increase in population will lower the weekly wage by just under 6% and lower hours by 4%. There is no statistically significant effect on the hourly wage. Given that these changes in weekly hours and earnings suggest a rise in hourly wages of less than two percent, arguably this is not too surprising. One may also want to note that the difference in the effect on weekly wages and hours between skill levels is not statistically significant.

One aspect that could potentially undermine our instrumental variables strategy is that weather shocks which affect agricultural productivity may affect the supply of agricultural goods and demand for industrial goods and hence affect wages and employment in areas not directly impacted by the shocks. To take account of this we follow Strobl and Valfort (2015) and use satellite derived nightlight imagery as a proxy for local economic conditions.[24] The results of which are shown in specification 3, where specification 2 does not control for nightlights but uses the same sub-sample for which this variable is available. As can be seen, the results are very similar for all specifications, i.e., including a control for provincial demand does not seem to substantially alter the results. Excluding the two waves of data where nightlights is not available does make the coefficients on net migration less precise, but, this may be in part simply because as we will show below, he effect is more precisely estimated in the period before the 1997 financial crisis.

Our definition of skill is arguably a somewhat arbitrary cut-off in that we define high skill as those with secondary education or above. While less than secondary education is arguably a reasonable categorisation of low skill, as we noted earlier there is likely to be substantial variation in skill levels for workers categorised as high skill by this definition. To test if changing this cut-off makes much difference we try alternative definitions of skill in Table 7. In this regard specification 1 shows results where high skill is defined to be greater than lower elementary, while specification 2 employs the same definition except that it excludes the nightlights variable and thus uses all waves of data. We see the results are broadly similar to what we saw in Table 6. There are some marginally significant very small negative effects for high skill males in the OLS specification, but these are not statistically significant in the instrumented regressions. For the low skilled sample the instrumented regressions predict a fall in weekly wages of 8.1 percent which is driven by a reduction in

[24] Nightlight intensity is measured from the satellite derived measures as taken from the Defense Meteorological Satellite Program satellites, which provide normalized light intensity at night at the approximately 1 km^2 grid cell level across the globe. Since the public data is annual, we linearly interpolate between year values to obtain semi-annual estimates. One should note that the use of nightlight imagery has now been used in a number of studies to proxy local economic activity; see, for instance, Chen and Nordhaus (2011) and Henderson et al. (2011).

hours of 5.2 percent when population increases by ten percent, interestingly this estimate of the elasticity of weekly earnings is larger than the estimate of 5.8 percent for the broader definition of low skill contained in Table 6. Specification 3 looks at a narrower definition of high skill by limiting it to those with upper secondary education or more. As can be seen, there are no statistically significant results using this alternative definition but the sample size is much smaller for high skill workers using this categorisation[25].

In Table 8 we investigate the role of the Asian financial crisis, which began in Thailand in 1997 and led to a severe downturn. To look at the effects of this negative aggregate demand shock we split the sample into waves before and after February 1997. This seems to make a substantial difference to the results. While the OLS results suggest a statistically significant fall of about half an hour for employees across skill groups for a ten percent increase in population, as with the earlier results the instrumented results suggest that the hours effect is concentrated in low skill employees who had a percentage fall in hours of about 2.3 percent for a ten percent increase in population and a fall in weekly wage of about 3 percent. Broadly the effects are much stronger for the pre-crisis period than the post crisis period. In this regard, the Thailand Migration Report (2011) in its analysis of internal migration noted that the 2009 National Migration Survey reported that "73.9 per cent of rural migrants said that their most recent migration was to return home, an increase over the 66.4 per cent from who said this in 2008. This finding provides evidence that return migration is a common response in times of economic contraction". Thus it is plausible in the Thai context that a substantial demand shock, as was the 1997 crisis, could lead to changes in the patterns of and returns to migration.

[25] We should note that the underlying migration flows used in these regressions are based on the original skill definition. The alternative definition of skill is only used to divide the sample used in the regressions.

Table 9 looks at the results by municipal area our proxy of urban rural. There is some evidence here that the results are more associated with urban migrants. We see that none of the instrumented coefficients on weekly or hourly wages, or weekly hours are statistically significant for the non-municipal group, even though this group has a larger sample. For municipal workers there are statistically significant negative effects on instrumented hours although surprisingly, there is no effect on instrumented log weekly wages despite the large negative impact on weekly hours which implies a percentage fall in hours of 2.5% from an increase in population of ten percent, so these results are mixed.

Tables A4-A6 in the appendix look at the impact of migration on wages for self-employed workers in business and Agriculture as well as comparing the results for both employees and the self-employed across the high and low seasons. These results which are discussed in the appendix are generally inconclusive. Our estimates for self-employed wage effects tend to be noisy in particular. Given the problems in measuring self–employed wages discussed earlier this is perhaps unsurprising. Similarly it is difficult to discern any pattern in the results by season

IV.3 Comparing the elasticities with those from the literature

As we discussed in the introduction there is a large literature estimating the impact of shocks in inward migration on native wages. While many do not explicitly consider hours we can still compare our estimates of the elasticity of weekly earnings or hourly earnings from a change in migration with those from other studies. For internal migration the estimates in Kleemens and Magruder (2014) for Indonesia suggest that a 1 percent increase in the population reduces native income by over 1 percent when migration is instrumented. Maystadt et al. (2014) find higher estimates of a fall in around 5 percent in the real monthly wage of low skill workers in Nepal when labour supply increases by 1 percent, interestingly statistically significant effects in wages are only found for formal sector workers. These estimates are higher than the instrumented estimates for weekly earnings of low skill workers contained in Tables 6-8 of this paper. These range from a ten percent increase in population decreasing weekly earnings by 3.8 percent for low skilled workers in table 8 for the period preceding the financial crisis to a decrease in weekly earnings of 8.1% for the narrower definition of low skill used in specification 1 of table 8.

As noted in the literature review the results from the vast literature on international migration Maystadt et al. (2014) examine Nepal, where the range of push and pull factors used to model migration inflows and outflows across regions includes weather, but also historical migration trends, measures of civil unrest and of environmental degradation, and show that inward migration leads to lower wages for formal sector natives and a loss of employment and rise in unemployment for lower skilled natives.

As noted earlier there is a vast empirical literature looking at the impact of international migration on native wages. Borjas (2015) stresses that an important lesson that has been learned from this literature is the importance of comparing an influx of new migrants with a control group of natives with similar skills and found that if labour supply of high school dropouts increases by 1 percent weekly wages of native high school dropouts fall by between 0.5-1.5 percent. Many other papers find little or no effects on native wages and the explanation given in studies such as Manacorda et al. (2006) and Ottaviano and Peri, 2012 that explain the absence of wage effects for natives by presenting evidence that migrants are imperfect substitutes for natives has become an important tenet of the literature. Since we focus on low skill workers moving within the same country arguably we deal with the concern that migrants need to be compared to natives with similar skills in an effective way. Unsurprisingly given this we find negative effects on weekly earnings. Our estimates are smaller than those in Borjas but substantial when compared to much of the literature. For example Friedberg and Hunt (1995) in their review of this literature conclude that "….. a 10 percent increase in the fraction of immigrants in the population reduces native wages by at most 1 percent.

V. *Conclusion*

In this paper we have examined the impact of net inward migration on local labour markets in Thailand, specifically focusing on weekly wages and hours worked. To this end we constructed a data set of regional migration flows and individual labour market outcomes for the period 1991 to 2000 using the Thai Labour Force Survey. Our results show that instrumenting for the possible endogeneity of net inward migration is crucial to the analysis. The results suggest that wages of low skill male workers are highly flexible with substantial adjustments in hours worked and weekly wages in response to short term changes in labour supply. We find no effect on high skilled workers. One possible explanation may be that hours and wages are slower to adjust for skilled workers due to implicit contracts, firm specific capital or other institutional features that limit firms' ability or willingness to adjust wages in response to possibly temporary shock.[26] Another possibility is that if there is a degree of imperfect substitutability between natives and migrants that this is only the case amongst higher skill groups as Card (2009) suggests, our definition of high skill possibly includes substantial heterogeneity in skill levels within the group.

[26] See Beaudry and Dinardo (1991) for an example and some evidence for an implicit contracts model while Hall (2005) shows that the local monopoly rents in a search matching model mean that wages can be sticky without violating rationality.

While there is a large literature estimating the impact of migration on wages, typically such studies do not consider variations in hours per period. The empirical results presented here suggest that at least in some cases reductions in hours worked may be driving the reduction in weekly wages so that ignoring the impact on hours may provide an incomplete picture of migration on the local labour market. For example in the Thai context, if we restricted our analysis to hourly wages the empirical results would suggest that migration does not affect wages while in fact there are substantial changes in weekly earnings associated with hours.

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Table 1a
The Effect of Weather on Migrant Flows

	OUTRATE	INRATE
DRY	0.00266*	-2.45e-05
	(0.00130)	(0.000964)
WET	0.00352*	-0.00358**
	(0.00135)	(0.000701)
EVAPO	-0.000222*	0.000710**
	(8.90e-05)	(0.000192)
EVAPO*WET	3.04e-05	-5.95e-05**
	(1.55e-05)	(1.16e-05)
EVAPO*DRY	3.36e-05*	-1.34e-05
	(1.56e-05)	(6.74e-06)
Observations	1,440	1,440
Number of groups	72	72
F-test	4.963	8.616

Notes: (i) Driscoll and Kraay (1998) standard errors corrected for spatial and autocorrelation in parentheses; (ii) ** and * are 1 and 5 per cent significance levels; (iii) year and binannual dummies included but not reported; (iv) F-test is test of joint significance of the climatic variables.

Table 1b
The Effect of Weather on Outflow Rates

	(1)	(2)	(3)
DRY	0.00142*	0.00166*	0.00120
	(0.000625)	(0.000648)	(0.000618)
WET	0.00235**	0.00231**	0.00238**
	(0.000709)	(0.000692)	(0.000736)
EVAPO	-0.000227**	-0.000262**	-0.000197**
	(7.61e-05)	(8.85e-05)	(6.81e-05)
EVAPO*WET	2.75e-05**	2.54e-05**	2.95e-05**
	(7.25e-06)	(7.64e-06)	(7.35e-06)
EVAPO*DRY	1.88e-05*	2.14e-05*	1.65e-05*
	(7.68e-06)	(9.34e-06)	(6.40e-06)
Sample	Men	Low-Skilled Men	High-Skilled Men
Observations	1,440	1,440	1,440
Provinces	72	72	72
F-test	9.028	8.172	9.926

Notes: (i) Driscoll and Kraay (1998) standard errors corrected for spatial and autocorrelation in parentheses; (ii) ** and * are 1 and 5 per cent significance levels; (iii) year and binannual dummies included but not reported; (iv) F-test is test of joint significance of the climatic variables.

Table 1c
The Effect of Weather on Inflow Rates

	(1)	(2)	(3)
DRY	-0.000417**	-0.000562**	-0.000375**
	(0.000153)	(0.000129)	(0.000129)
WET	-0.000891*	-0.000797*	-0.000764**
	(0.000366)	(0.000325)	(0.000266)
EVAPO	0.000636**	0.000613**	0.000439**
	(0.000182)	(0.000163)	(0.000160)
EVAPO*WET	-8.68e-06	-5.18e-06	-9.63e-06
	(6.42e-06)	(5.34e-06)	(4.97e-06)
EVAPO*DRY	-9.25e-06	-9.87e-06	-9.74e-06
	(1.10e-05)	(7.63e-06)	(6.74e-06)
Sample	Men	Low-Skilled Men	High-Skilled Men
Observations	1,440	1,440	1,440
Provinces	72	72	72
F-test	18.15	31.16	8.963

Notes: (i) Driscoll and Kraay (1998) standard errors corrected for spatial and autocorrelation in parentheses; (ii) ** and * are 1 and 5 per cent significance levels; (iii) year and binannual dummies included but not reported; (iv) F-test is test of joint significance of the climatic variables.

Table 2
Relationship between Predicted and Actual Migration for Men by Skill

	Total Sample	Low-Skilled Subsample	High-Skilled Subsample
WLS Regression			
Predicted in-migration rate	5.332**	3.007**	3.262**
	(2.592)	(1.300)	(1.387)
Predicted out-migration rate	-9.537***	-4.101***	-5.539***
	(2.302)	(1.128)	(1.219)
F-Statistic	15.1	16.1	12.4
Bootstrapped Procedure			
Predicted in-migration rate	5.576*	3.103**	3.491**
	(3.088)	(1.424)	(1.549)
Predicted out-migration rate	-9.591***	-4.168***	-5.490***
	(2.756)	(1.243)	(1.398)
Wald's Statistic	2057	1704	3535

Notes: (i) Regressions are estimated using individual data from the Thai LFS from 1991 to 2000; (ii) Standard errors are clustered by provinces and waves; (iii) Dummies for salaries period of payment (hourly, daily, weekly and monthly) are introduced. (iv) For wage regressions, we introduce the number of weekly working hours and its squared term; (v) We include both the high-skilled and low-skilled net instrumented migration rate for each of the six subsamples shown above; (vi) ***, ** and * denote significance at the level of 1%, 5% and 10% significance levels, respectively.

Table 3
Actual and Instrumented Inflow and Outflow Rates by Season

	Actual		Instrumented	
Region	**Outflow**	**Inflow**	**Outflow**	**Inflow**
Low season				
Bangkok	13.60%	5.56%	0.03%	0.02%
Central	2.98%	4.70%	0.18%	0.15%
North	3.23%	3.83%	0.15%	0.16%
Northeast	3.63%	5.18%	0.11%	0.12%
South	2.98%	2.52%	0.12%	0.11%
High Season				
Bangkok	15.39%	4.73%	0.04%	0.02%
Central	3.14%	4.52%	0.20%	0.15%
North	3.27%	4.21%	0.16%	0.16%
Northeast	3.63%	6.01%	0.12%	0.12%
South	2.98%	2.50%	0.13%	0.11%

Table 4
Actual and Instrumented Inflow and Outflow Rates by Municipal

	Actual		Instrumented	
Region	**Outflow**	**Inflow**	**Outflow**	**Inflow**
Low Skilled				
Non-municipal	2.69%	3.64%	0.30%	0.29%
Municipal	4.77%	3.70%	0.24%	0.22%
High Skilled				
Non-municipal	2.53%	3.47%	0.29%	0.28%
Municipal	4.67%	3.61%	0.24%	0.21%
Low Season				
Non-municipal	3.23%	4.26%	0.14%	0.14%
Municipal	5.34%	4.52%	0.12%	0.11%
High Season				
Non-municipal	3.23%	4.56%	0.15%	0.14%
Municipal	5.75%	4.45%	0.12%	0.11%

Table 5
Share of High Skill by Occupation and Migrant Status

	Occcupation	Incumbents	Migrants
0	Professional	0.951499	0.932091
1	Administrative/Management Officer	0.594614	0.697959
2	Financial/Fiscal and Accounting Clerks	0.796385	0.829268
3	Wholesale/Retail Trader/Owner	0.402399	0.470088
4	Farmer/Fisherman/Hunter	0.102532	0.127994
5	Miner/Quarry Worker	0.175595	0.122449
6	Transportation	0.268199	0.342033
7	Cotton Spinner/Weaver/Knitter	0.294560	0.316324
8	Type Cutter/Printer/Bookbinder	0.209808	0.239597
9	Services/Sports	0.350680	0.387570

Table 6
Effects of Net Inflow Rate on Employees – Checking for Nightlights

		Specification 1			Specification 2	Specification 3
		Males	High-skilled males	Low-skilled males	Low-skilled males	Low-skilled males
OLS	**Log Weekly Wage**	-0.059** (0.027)	-0.043 (0.030)	-0.043 (0.032)	-0.040 (0.031)	-0.053* (0.031)
	R^2	0.593	0.635	0.460	0.460	0.478
IV	**Log Weekly Wage**	**-0.348**** (0.140)	-0.186 (0.134)	**-0.578**** (0.257)	-0.470* (0.249)	**-0.508**** (0.216)
	R^2	0.593	0.635	0.458	0.459	0.476
OLS	**Log Hourly Wage**	-0.084** (0.042)	-0.094* (0.057)	-0.068 (0.044)	-0.065 (0.044)	-0.073* (0.042)
	R^2	0.589	0.639	0.408	0.408	0.433
IV	**Log Hourly Wage**	-0.217 (0.149)	-0.205 (0.155)	-0.356 (0.245)	-0.256 (0.238)	-0.304 (0.206)
	R^2	0.589	0.639	0.408	0.408	0.433
OLS	**Weekly Hours**	1.305 (2.144)	2.201 (2.276)	1.276 (2.622)	1.256 (2.631)	0.700 (2.447)
	R^2	0.124	0.150	0.104	0.104	0.104
IV	**Weekly Hours**	**-10.67*** (5.916)	1.091 (4.288)	**-20.65**** (10.02)	**-20.60**** (10.23)	**-19.40**** (8.947)
IV	**Elasticity Weekly Hours**	-0.209	0.022	-0.396	-0.395	-0.371
	R^2	0.122	0.150	0.099	0.104	0.100
	Observations	**182,085**	**60,245**	**121,840**	**121,840**	**130,049**

Notes: (i) Specification 1 includes the nightlights variable; (ii) Specification 2 excludes the nightlights variable but uses the same sample for low-skilled males as Specification 1; (iii) Specification 3 excludes the nightlights variable for the low-skilled males and includes the extra waves; (iv) Robust standard errors are in parentheses; (v) *** p<0.01, ** p<0.05, * p<0.1; (vi) We report coefficient estimates in bold face if they are significant based on Anderson-Rubin (1949) robust 95% confidence intervals.

Table 7
Effects of Net Inflow Rate on Employees – Alternative Measures of Skills

		Specification 1		Specification 2		Specification 3
		High-skilled males	Low-skilled males	High-skilled males	Low-skilled males	High-skilled males
OLS	**Log Weekly Wage**	-0.050* (0.029)	-0.035 (0.042)	-0.079** (0.032)	-0.042 (0.038)	-0.061 (0.039)
	R^2	0.640	0.467	0.645	0.483	0.638
IV	**Log Weekly Wage**	-0.092 (0.127)	-0.817** (0.355)	-0.104 (0.113)	-0.727** (0.299)	-0.146 (0.134)
	R^2	0.640	0.464	0.645	0.481	0.638
OLS	**Log Hourly Wage**	-0.094* (0.054)	-0.056 (0.047)	-0.108** (0.053)	-0.061 (0.044)	-0.082 (0.064)
	R^2	0.644	0.404	0.650	0.428	0.641
IV	**Log Hourly Wage**	-0.032 (0.149)	-0.543 (0.333)	-0.024 (0.134)	-0.463* (0.277)	-0.197 (0.169)
	R^2	0.644	0.403	0.650	0.427	0.641
OLS	**Weekly Hours**	2.315 (2.381)	0.241 (2.522)	1.288 (2.367)	0.018 (2.288)	0.649 (1.910)
	R^2	0.138	0.108	0.141	0.108	0.168
IV	**Weekly Hours**	-3.546 (5.015)	-27.32** (12.54)	-5.010 (4.574)	-26.53** (11.24)	2.574 (4.012)
IV	**Elasticity Weekly Hours**	-0.071	-0.523	-0.100	-0.507	0.054
	R^2	0.137	0.101	0.140	0.100	0.168
	Observations	**101,210**	**80,875**	**107,722**	**86,688**	**37,379**

__**Notes:**__ (i) Specification 1 includes the nightlights variable and low skill is an education level of lower elementary or less; (ii) Specification 2 excludes the nightlights variable and uses all waves; (iii) In Specification 3, high skill is an education level greater than upper secondary; (iv) Robust standard errors are in parentheses; (v) *** p<0.01, ** p<0.05, * p<0.1.

Table 8
Effects of Net Inflow Rate on Males – Pre Financial Crisis vs. Post Financial Crisis Period

		Pre Financial Crisis Period					Post Financial Crisis Period				
		Employees	High-skilled Employees	Low-skilled Employees	Business	Agriculture	Employees	High-skilled Employees	Low-skilled Employees	Business	Agriculture
OLS	**Log Weekly Wage**	-0.149*** (0.048)	-0.150*** (0.053)	-0.076 (0.048)	0.303* (0.171)	-0.581 (0.374)	-0.082** (0.037)	-0.009 (0.043)	-0.091** (0.039)	-0.108 (0.070)	0.240 (0.159)
	R^2	0.594	0.634	0.469	0.268	0.450	0.586	0.638	0.433	0.224	0.419
IV	**Log Weekly Wage**	-0.287*** (0.086)	-0.173* (0.105)	-0.388*** (0.136)	-0.030 (0.313)	2.591** (1.042)	-0.796 (0.704)	-0.347 (0.343)	-0.327 (0.341)	0.084 (0.420)	-0.269 (0.449)
	R^2	0.594	0.634	0.469	0.268	0.447	0.582	0.637	0.432	0.224	0.419
OLS	**Log Hourly Wage**	-0.084 (0.052)	-0.053 (0.060)	-0.022 (0.050)	0.427** (0.186)	-0.769* (0.399)	-0.147** (0.075)	-0.150 (0.102)	-0.148** (0.071)	-0.154* (0.090)	0.187 (0.194)
	R^2	0.593	0.641	0.426	0.229	0.491	0.568	0.638	0.336	0.181	0.473
IV	**Log Hourly Wage**	-0.188** (0.091)	-0.084 (0.111)	-0.287** (0.139)	0.128 (0.321)	2.509** (1.161)	-0.413 (0.494)	-0.855 (0.546)	-0.148 (0.336)	0.260 (0.478)	-0.763 (0.628)
	R^2	0.593	0.641	0.426	0.229	0.488	0.568	0.635	0.336	0.181	0.472
OLS	**Weekly Hours**	-5.904*** (1.160)	-4.806*** (1.204)	-6.678*** (1.678)	-8.354*** (2.372)	12.95** (5.831)	4.982 (3.712)	6.773* (3.733)	5.187 (4.591)	3.781 (3.062)	2.328 (2.774)
	R^2	0.128	0.161	0.097	0.035	0.270	0.123	0.152	0.113	0.052	0.341
IV	**Weekly Hours**	-9.085*** (2.564)	-4.021 (2.552)	-12.17*** (4.181)	-10.07** (4.957)	15.43 (17.29)	-30.34 (37.70)	29.74 (19.30)	-19.01 (22.43)	-7.670 (9.762)	19.32* (10.65)
IV	**Elasticity Weekly Hours**	-0.175	-0.081	-0.229	-0.181	0.295	-0.608	0.616	-0.374	-0.141	0.391
	R^2	0.127	0.161	0.097	0.035	0.270	0.098	0.139	0.105	0.050	0.340
	Observations	**122,378**	**38,480**	**83,898**	**108,540**	**110,398**	**72,032**	**25,881**	**46,151**	**75,175**	**72,012**

Notes: (i) Regressions are estimated using individual data from the Thai LFS from 1991 to 2000; (ii) Standard errors are clustered by provinces and waves; (iii) Dummies for salaries period of payment (hourly, daily, weekly and monthly) are introduced. (iv) For weekly wage regressions, we introduce the number of weekly working hours and its squared term; (v) With the instrumental variable technique, we include the net instrumented migration rate specific for each subsample; (vi) ***, ** and * denote significance at 1%, 5% and 10% significance levels, respectively.

Table 9
Effects of Net Inflow Rate on Males – Non-municipal vs. Municipal Area

		Non-municipal area					Municipal area				
		Employees	High-skilled Employees	Low-skilled Employees	Business	Agriculture	Employees	High-skilled Employees	Low-skilled Employees	Business	Agriculture
OLS	**Log Weekly Wage**	0.011 (0.045)	-0.050 (0.089)	0.014 (0.054)	0.141 (0.128)	0.174 (0.144)	-0.067*** (0.025)	-0.069** (0.035)	-0.042 (0.032)	-0.137** (0.069)	-0.220 (0.276)
	R^2	0.569	0.606	0.511	0.223	0.444	0.616	0.648	0.427	0.220	0.531
IV	**Log Weekly Wage**	-0.353 (0.683)	-0.337 (0.741)	0.030 (0.947)	3.638* (2.140)	3.052 (3.007)	0.022 (0.097)	-0.088 (0.131)	0.098 (0.143)	0.209 (0.340)	-2.707 (3.952)
	R^2	0.569	0.606	0.511	0.209	0.437	0.616	0.648	0.427	0.220	0.523
OLS	**Log Hourly Wage**	0.022 (0.048)	-0.019 (0.094)	0.022 (0.058)	0.179 (0.127)	-0.248 (0.166)	-0.110** (0.044)	-0.118** (0.057)	-0.088* (0.051)	-0.192** (0.082)	-0.117 (0.320)
	R^2	0.544	0.604	0.450	0.186	0.491	0.623	0.652	0.411	0.199	0.566
IV	**Log Hourly Wage**	-0.115 (0.678)	-0.410 (0.797)	0.322 (0.943)	3.766* (2.138)	5.003 (3.946)	0.164 (0.124)	-0.021 (0.150)	0.302* (0.173)	0.469 (0.373)	-1.214 (4.571)
	R^2	0.544	0.604	0.450	0.171	0.470	0.623	0.652	0.410	0.197	0.565
OLS	**Weekly Hours**	-2.560 (1.817)	-2.613 (2.465)	-2.542 (2.306)	-1.117 (2.212)	18.153*** (2.879)	1.988 (2.193)	1.554 (2.258)	2.650 (2.789)	3.379 (2.272)	-2.200 (6.619)
	R^2	0.114	0.136	0.108	0.043	0.289	0.158	0.170	0.121	0.030	0.297
IV	**Weekly Hours**	-13.863 (16.652)	1.791 (18.014)	-5.434 (23.172)	-12.559 (22.657)	-62.720 (60.354)	-8.450** (4.212)	-3.492 (3.821)	-13.243** (5.991)	-15.021* (7.970)	-84.082 (73.020)
IV	**Elasticity Weekly Hours**	-0.268	0.036	-0.104	-0.233	-1.223	-0.167	-0.072	-0.253	-0.266	-1.791
	R^2	0.113	0.136	0.108	0.042	0.253	0.155	0.169	0.116	0.027	0.237
	Observations	**115,102**	**26,542**	**88,560**	**97,416**	**176,627**	**79,308**	**37,819**	**41,489**	**86,299**	**5,783**

Notes: (i) Regressions are estimated using individual data from the Thai LFS from 1991 to 2000; (ii) Standard errors are clustered by provinces and waves; (iii) Dummies for salaries period of payment (hourly, daily, weekly and monthly) are introduced. (iv) For weekly wage regressions, we introduce the number of weekly working hours and its squared term; (v) With the instrumental variable technique, we include the net instrumented migration rate specific for each subsample; (vi) ***, ** and * denote significance at 1%, 5% and 10% significance levels, respectively.

Table 10
Probability of Wishing to Work more Hours

	Employees		**Business**		**Agriculture**	
VARIABLES	OLS	IV	OLS	IV	OLS	IV
Net inflow rate	0.086***	0.241*	0.108***	-0.056	-0.029	-2.250
	(0.029)	(0.129)	(0.023)	(0.208)	(0.073)	(1.437)
Observations	182,085	182,085	173,482	173,482	169,000	169,000
R-squared	0.072	0.072	0.036	0.035	0.063	0.016

Notes: (i) Robust standard errors in parentheses; (ii) ***, ** and * denote significance at 1%, 5% and 10% significance levels, respectively.

Figure 1: Thai Provinces

Figure 2: Average Relationship between Distance and Inflow Rate

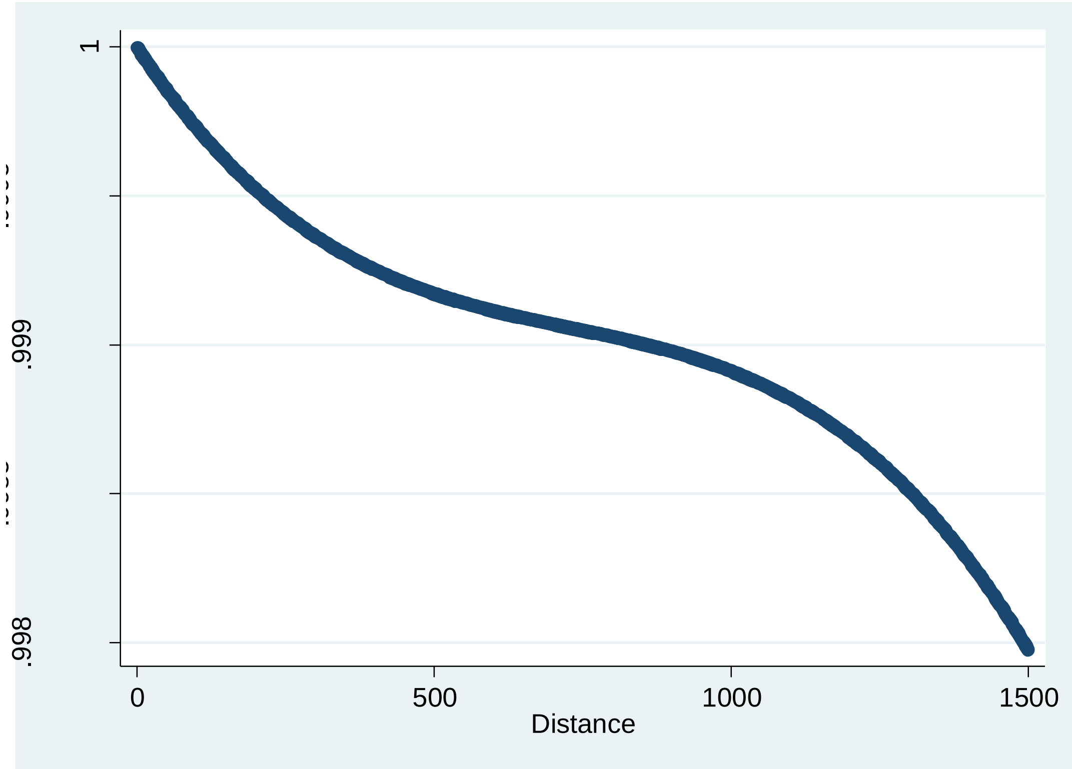
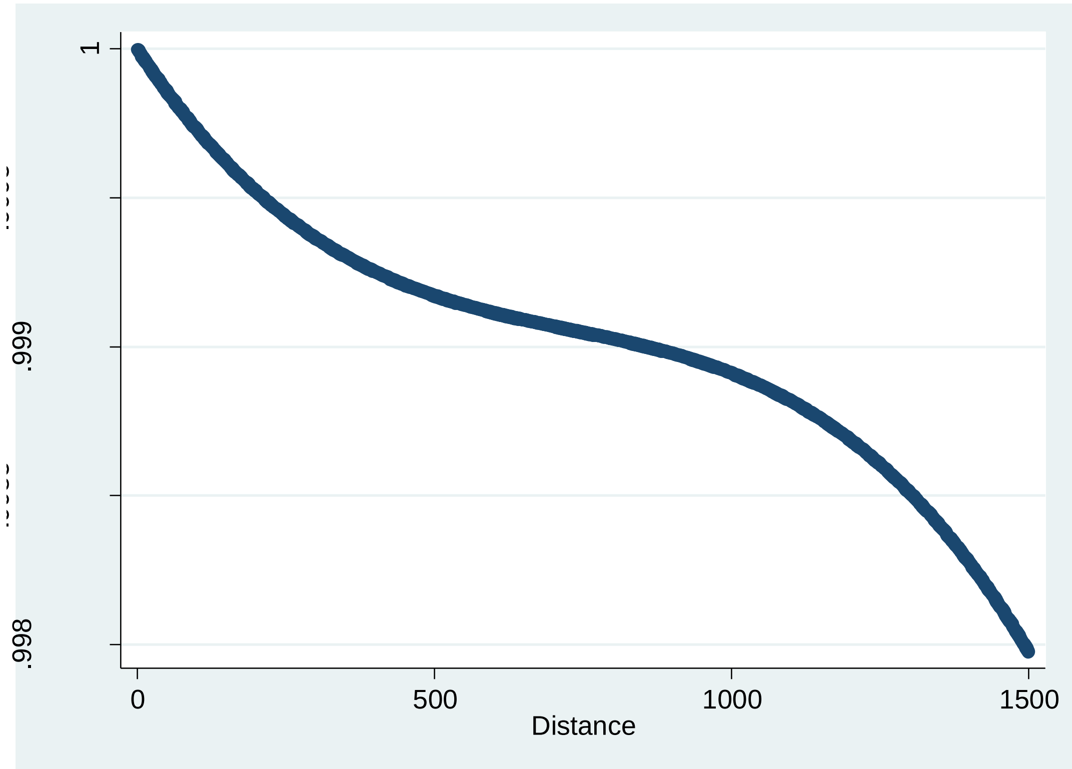


Figure 3: Average Relationship between Distance and Outflow Rate



APPENDIX

Table A1
Summary Statistics for Employees

Variables	Native Employees		Migrant Employees	
Weekly nominal wage	1,172	(1,227)	1,052	(916.7)
Actual net inflow rate	-0.001	(0.068)	0.017	(0.067)
Age	33.68	(10.97)	27.89	(8.820)
Marital status				
Single person	0.312	(0.463)	0.463	(0.499)
Married person	0.657	(0.475)	0.515	(0.500)
Widowed person	0.011	(0.102)	0.004	(0.064)
Divorced person	0.008	(0.090)	0.005	(0.068)
Education Level				
None	0.025	(0.157)	0.015	(0.122)
Less than Pratom 4	0.022	(0.148)	0.015	(0.120)
Lower elementary	0.396	(0.489)	0.255	(0.436)
Elementary	0.225	(0.418)	0.350	(0.477)
Lower secondary	0.140	(0.347)	0.163	(0.370)
Upper secondary	0.053	(0.223)	0.074	(0.263)
Lower vocational	0.000	(0.002)	0.000	(0.007)
Upper and higher vocational	0.049	(0.216)	0.042	(0.201)
University academic	0.042	(0.201)	0.032	(0.176)
University technical vocational	0.038	(0.191)	0.046	(0.210)
Teacher training	0.009	(0.095)	0.006	(0.078)
Short Course vocational	0.000	(0.007)	0.000	(0.012)
Other	0.000	(0.021)	0.001	(0.023)
Occupation				
Professional	0.052	(0.223)	0.049	(0.216)
Administrative/Management Officer	0.017	(0.131)	0.011	(0.106)
Financial/Fiscal and Accounting Clerks	0.076	(0.265)	0.067	(0.251)
Wholesale/Retail Trader/Owner	0.050	(0.217)	0.053	(0.225)
Farmer/Fisherman/Hunter	0.126	(0.331)	0.088	(0.284)
Miner/Quarry Worker	0.003	(0.052)	0.002	(0.042)
Transportation	0.110	(0.313)	0.076	(0.264)
Cotton Spinner/Weaver/Knitter	0.365	(0.481)	0.412	(0.492)
Type Cutter/Printer/Bookbinder	0.146	(0.353)	0.162	(0.369)
Services/Sports	0.054	(0.227)	0.079	(0.269)
Industry				
Agriculture, Forestry and Fishing	0.128	(0.334)	0.090	(0.286)
Mining	0.008	(0.087)	0.006	(0.075)
Manufacturing	0.117	(0.322)	0.149	(0.357)
Rubber	0.171	(0.377)	0.226	(0.418)
Construction	0.250	(0.433)	0.232	(0.422)
Sanitary Services	0.001	(0.035)	0.002	(0.044)
Commerce	0.168	(0.374)	0.143	(0.350)
Transportation	0.051	(0.219)	0.031	(0.174)
Services	0.105	(0.306)	0.121	(0.326)
Others	0.001	(0.024)	0.000	(0.020)

Firm size				
1-4 employees	0.242	(0.429)	0.184	(0.387)
5-9 employees	0.234	(0.423)	0.182	(0.386)
10-19 employees	0.159	(0.365)	0.145	(0.352)
20-49 employees	0.111	(0.314)	0.129	(0.335)
50-99 employees	0.060	(0.237)	0.082	(0.275)
100-199 employees	0.160	(0.366)	0.221	(0.415)
200+ employees	0.035	(0.183)	0.058	(0.233)
Wage pay period				
Daily	0.511	(0.500)	0.526	(0.499)
Weekly	0.008	(0.091)	0.007	(0.086)
Monthly	0.479	(0.500)	0.463	(0.499)
Working hours per week	51.44	(11.20)	52.66	(11.01)
Municipal area dummy	0.401	(0.490)	0.436	(0.496)
log_nl	9.316	(1.132)	9.409	(1.110)
Observations	**182,085**		**20,276**	

Notes: The sample of natives in the table is the same sample used in the regression analysis. Migrants were not included in the regression analysis but the sample of migrants included in the table is the sample that would have been included if they were part of the regression analysis.

Table A2
Summary Statistics for Self-employed

Variables	Self-employed Business				Self-employed Agriculture			
	Natives		Migrants		Natives		Migrants	
Weekly net profit	1,358	(2,004)	1,201	(1,754)	318.3	(614.6)	154.4	(283.6)
Actual net inflow rate	0.002	(0.059)	0.017	(0.054)	0.010	(0.043)	0.034	(0.038)
Age	40.06	(11.61)	32.62	(9.884)	40.61	(12.77)	31.44	(10.37)
Marital status								
Single person	0.167	(0.373)	0.270	(0.444)	0.158	(0.365)	0.294	(0.456)
Married person	0.804	(0.397)	0.705	(0.456)	0.817	(0.386)	0.689	(0.463)
Widowed person	0.013	(0.112)	0.006	(0.079)	0.016	(0.125)	0.005	(0.067)
Divorced person	0.007	(0.081)	0.007	(0.086)	0.004	(0.061)	0.005	(0.068)
Eudcation level								
None	0.028	(0.164)	0.012	(0.110)	0.048	(0.214)	0.015	(0.123)
Less than Pratom 4	0.023	(0.149)	0.012	(0.109)	0.031	(0.173)	0.018	(0.133)
Lower elementary	0.463	(0.499)	0.320	(0.467)	0.645	(0.479)	0.487	(0.500)
Elementary	0.143	(0.350)	0.231	(0.422)	0.174	(0.379)	0.351	(0.477)
Lower secondary	0.161	(0.368)	0.183	(0.386)	0.068	(0.252)	0.085	(0.279)
Upper secondary	0.058	(0.234)	0.075	(0.264)	0.019	(0.136)	0.026	(0.158)
Lower vocational	0.000	(0.006)	0.000	(0.011)	0.000	(0.006)	0.000	(0.000)
Upper and higher vocational	0.048	(0.213)	0.058	(0.234)	0.008	(0.088)	0.008	(0.090)
University academic	0.039	(0.194)	0.054	(0.227)	0.002	(0.042)	0.003	(0.052)
University technical vocational	0.029	(0.167)	0.042	(0.201)	0.004	(0.061)	0.005	(0.069)
Teacher training	0.009	(0.093)	0.010	(0.099)	0.002	(0.044)	0.002	(0.045)
Short Course vocational	0.000	(0.016)	0.000	(0.022)	0.000	(0.004)	0.000	(0.011)
Other	0.001	(0.027)	0.001	(0.030)	0.000	(0.012)	0.000	(0.000)
Working hours per week	55.25	(15.92)	56.13	(15.88)	52.35	(14.24)	56.09	(12.91)
Municipal area dummy	0.469	(0.499)	0.466	(0.499)	0.032	(0.177)	0.014	(0.116)
log_nl	9.182	(1.042)	9.140	(0.990)	8.321	(0.863)	8.088	(0.702)
Observations	**173,482**		**8,605**		**169,000**		**8,887**	

Notes: The sample of natives in the table is the same sample used in the regression analysis. Migrants were not included in the regression analysis but the sample of migrants included in the table is the sample that would have been included if they were part of the regression analysis.

Table A3
Sample of Incumbents and Migrants
by Region, Skill Group, Season, Period and Residence Area type

	Incumbents		Migrants	
Region				
Bangkok	48,249	(93.52%)	3,342	(6.48%)
Central	206,538	(93.45%)	14,476	(6.55%)
North	148,680	(93.94%)	9,598	(6.06%)
Northeast	187,814	(90.84%)	18,936	(9.16%)
South	120,169	(96.19%)	4,755	(3.81%)
Skill group				
High-skilled	214,765	(92.47%)	17,495	(7.53%)
Low-skilled	496,685	(93.66%)	33,612	(6.34%)
Season				
High season	352,446	(93.10%)	26,105	(6.90%)
Low season	359,004	(93.49%)	25,002	(6.51%)
Period				
Pre-crisis	430,294	(93.33%)	30,752	(6.67%)
Post-crisis	281,156	(93.25%)	20,355	(6.75%)
Area				
Non-municipal	479,802	(93.46%)	33,551	(6.54%)
Municipal	231,648	(92.96%)	17,556	(7.04%)
Worker				
Employees	201,145	(89.37%)	23,920	(10.63%)
Agriculture self-employed	182,410	(94.98%)	9,633	(5.02%)
Business Self-employed	183,715	(95.29%)	9,073	(4.71%)
Total	**711,450**	**(93.30%)**	**51,107**	**(6.70%)**

Table A4
Effects of Net Inflow Rate – Checking for Self-employed

		Specification 1			Specification 2		
		Males	High-skilled males	Low-skilled males	Males	High-skilled males	Low-skilled males
OLS	**Log Weekly Wage**	0.032 (0.073)	0.101 (0.0949)	-0.054 (0.092)	0.026 (0.083)	0.078 (0.103)	-0.022 (0.095)
	R^2	0.247	0.210	0.203	0.252	0.216	0.207
IV	**Log Weekly Wage**	-0.308 (0.646)	0.298 (0.620)	-0.692 (0.905)	0.879 (0.615)	0.382 (0.581)	1.020 (0.826)
	R^2	0.247	0.210	0.202	0.251	0.216	0.205
OLS	**Log Hourly Wage**	0.006 (0.083)	0.030 (0.120)	-0.063 (0.101)	0.007 (0.096)	0.021 (0.127)	-0.027 (0.107)
	R^2	0.206	0.188	0.158	0.213	0.195	0.165
IV	**Log Hourly Wage**	0.230 (0.673)	0.794 (0.722)	-0.109 (0.913)	1.204* (0.662)	0.810 (0.664)	1.380 (0.861)
	R^2	0.206	0.187	0.158	0.210	0.194	0.162
OLS	**Weekly Hours**	2.309 (2.404)	4.252 (2.790)	1.593 (2.934)	1.777 (2.022)	3.343 (2.428)	1.189 (2.438)
	R^2	0.040	0.034	0.044	0.039	0.033	0.043
IV	**Weekly Hours**	-35.59** (13.89)	-27.44* (15.23)	-42.68** (16.97)	-21.28** (10.48)	-24.67* (13.42)	-24.71* (12.94)
IV	**Elasticity Weekly Hours**	-0.647	-0.488	-0.785	-0.386	-0.439	-0.453
	R^2	0.030	0.027	0.033	0.035	0.027	0.039
	Observations	**173,482**	**59,756**	**113,726**	**183,715**	**62,744**	**120,971**

Notes: (i) Regressions are estimated using individual data from the Thai LFS from 1991 to 2000; (ii) Standard errors are clustered by provinces and waves;. (iii) For weekly wage regressions, we introduce the number of weekly working hours and its squared term; (iv) With the instrumental variable technique, we include the net instrumented migration rate specific for each subsample; (v) ***, ** and * denote significance at 1%, 5% and 10% significance levels, respectively.

Discussion of results in Table A4:

Table A4 looks at the results for self-employed workers in business. Again we check for the importance of controlling for relative demand by including and not including nightlights. We find no statistically significant coefficient on the net-profit variables in any specification apart from the instrumented coefficient on males for hourly wage in specification 2, although this is effect is only marginally significant. However, given the serious measurement issues for net-profit discussed earlier we are reluctant to put much weight on the income estimates. There is also no statistically significant OLS coefficient for weekly hours and the coefficients all imply very small elasticities. By contrast, all the instrumented coefficients for hours worked are statistically significant across all specifications, although some only marginally so. In this respect, the percentage change in hours is 7.8 percent and 4.5 percent in specifications 1 and 2 for a 10 percent increase in population[27].

The theoretical predictions on wages and hours are arguably less clear for self-employed natives than for employees. About five percent of self-employed business workers are recent migrants so that increased inward migration may lead to an increase in the number of competitors, perhaps due to low skilled workers switching into self-employment where entry and exit is not costly. This would lower profits. Increased inward migration will also however increase labour supply of potential employees for self-employed employers, resulting in the opposite effect. Thus the negative coefficients on weekly hours may represent a decline in the demand for self-employed services of natives caused by increased competition or increases in the supply of potential employees may allow natives to increase their leisure. The OLS results from Table A4, which examines the probability a worker would like to work more hours in the previous week, suggests that a 10 percent increase in population increase the probability an incumbent self-employed in business worker would like to work more hours by 1 percent. Thus migration may be leading to an involuntary reduction in hours, which supports the hypothesis that migrants are competitors in business. The coefficient for the instrumental variables specification, in contrast, is negative and statistically insignificant. Perhaps then recent migrants who respond to weather shocks are less likely to start their own business, although we have no

[27] As we noted earlier in the paper while there are serious measurement issues in measuring the wage of self-employed workers, there is no particular reason we are aware of that measurement error should be greater for hours worked.

way of checking this. Another factor that may affect the demand for self-employed services is that changes in the composition of the workforce may lead to changes in the composition of consumption for natives. Maystadt et al. (2014) discuss this and present evidence that the relative demand for low skilled services declined in response to increased regional migration in Nepal.

Table A5
Effects of Net Inflow Rate – Checking for Agriculture Activities

		Specification 1			Specification 2		
		Males	High-skilled males	Low-skilled males	Males	High-skilled males	Low-skilled males
OLS	**Log Weekly Wage**	0.255* (0.144)	-0.018 (0.228)	0.323** (0.158)	0.160 (0.138)	-0.047 (0.224)	0.216 (0.151)
	R^2	0.443	0.452	0.431	0.448	0.455	0.436
IV	**Log Weekly Wage**	1.421 (1.853)	-0.375 (2.034)	1.351 (1.902)	3.050 (2.940)	-2.570 (2.956)	2.153 (2.867)
	R^2	0.442	0.452	0.431	0.440	0.451	0.433
OLS	**Log Hourly Wage**	-0.105 (0.162)	-0.290 (0.259)	-0.055 (0.173)	-0.226 (0.159)	-0.354 (0.257)	-0.191 (0.172)
	R^2	0.490	0.496	0.478	0.494	0.499	0.482
IV	**Log Hourly Wage**	1.960 (2.212)	-1.248 (2.424)	2.330 (2.367)	4.958 (3.823)	-3.039 (3.299)	4.649 (3.831)
	R^2	0.487	0.496	0.475	0.474	0.495	0.468
OLS	**Weekly Hours**	15.65*** (2.846)	12.48*** (4.830)	16.58*** (3.186)	16.68*** (2.839)	13.74*** (4.827)	17.73*** (3.195)
	R^2	0.293	0.289	0.289	0.289	0.285	0.285
IV	**Weekly Hours**	-19.01 (34.64)	19.40 (34.64)	-33.08 (39.88)	-62.90 (58.78)	5.924 (45.46)	-82.89 (68.58)
IV	**Elasticity Weekly Hours**	-0.372	0.409	-0.643	-1.230	0.194	-1.608
	R^2	0.286	0.289	0.279	0.254	0.285	0.241
	Observations	**169,000**	**17,285**	**151,715**	**182,410**	**18,147**	**164,263**

<u>Notes:</u> (i) Regressions are estimated using individual data from the Thai LFS from 1991 to 2000; (ii) Standard errors are clustered by provinces and waves; (iii) For employees, Dummies for salaries period of payment (hourly, daily, weekly and monthly) are introduced. (iv) For weekly wage regressions, we introduce the number of weekly working hours and its squared term; (v) With the instrumental variable technique, we include the net instrumented migration rate specific for each subsample; (vi) ***, ** and * denote significance at 1%, 5% and 10% significance levels, respectively.

Discussion of results in Table A5

Table A5 looks at the results for self-employed natives in agriculture. Once again the results for net profit show no statistically significant effect in any specification. Again, this may be due to measurement error. While the OLS results predict a substantial and statistically significant positive effect of migration on hours there is no statistically significant effect for the instrumented coefficients on hours.

Table A6
Effects of Net Inflow Rate on Males – Distinction between Low and High Season

		February (Low demand Season)			August (High demand Season)		
		Employees	Business	Agriculture	Employees	Business	Agriculture
OLS	**Log Weekly Wage**	-0.108** (0.044)	0.021 (0.128)	0.109 (0.173)	-0.071** (0.036)	-0.027 (0.092)	0.335 (0.207)
	R^2	0.599	0.262	0.432	0.602	0.239	0.459
IV	**Log Weekly Wage**	-0.345** (0.167)	0.533 (0.857)	0.910 (3.325)	-0.304* (0.164)	1.031 (0.835)	6.308 (7.050)
	R^2	0.599	0.261	0.431	0.602	0.236	0.426
OLS	**Log Hourly Wage**	-0.137** (0.065)	-0.007 (0.150)	-0.248 (0.195)	-0.079 (0.051)	-0.035 (0.102)	-0.012 (0.221)
	R^2	0.594	0.222	0.465	0.602	0.202	0.515
IV	**Log Hourly Wage**	-0.184 (0.176)	1.051 (0.927)	2.025 (3.783)	-0.162 (0.185)	1.187 (0.875)	9.181 (9.893)
	R^2	0.594	0.220	0.461	0.602	0.199	0.453
OLS	**Weekly Hours**	1.062 (3.466)	2.198 (3.270)	15.08*** (3.190)	0.365 (2.344)	1.232 (2.502)	15.16*** (3.610)
	R^2	0.128	0.039	0.248	0.127	0.040	0.337
IV	**Weekly Hours**	-15.54** (6.743)	-35.00** (16.35)	-36.83 (65.61)	-8.915 (8.360)	-8.840 (13.18)	-107.1 (135.1)
IV	**Elasticity Weekly Hours**	-0.303	-0.637	-0.731	-0.175	-0.160	-2.078
	R^2	0.124	0.030	0.234	0.125	0.040	0.253
	Observations	**102,270**	**95,546**	**79,682**	**92,140**	**88,169**	**102,728**

Notes: (i) Regressions are estimated using individual data from the Thai LFS from 1991 to 2000; (ii) Standard errors are clustered by provinces and waves; (iii) For employees, Dummies for salaries period of payment (hourly, daily, weekly and monthly) are introduced. (iv) For weekly wage regressions, we introduce the number of weekly working hours and its squared term; (v) With the instrumental variable technique, we include the net instrumented migration rate specific for each subsample; (vi) ***, ** and * denote significance at 1%, 5% and 10% significance levels, respectively.

Discussion of results in Table A6

Table A6 investigates the seasonal variation in the results across employees and self-employed in agriculture and business. The main result is that the fall in instrumented weekly wages and hours is stronger in the low season. In the high season when we expect demand to be higher we see a fall in instrumented weekly wages which is significant at the ten percent level but no statistically significant change in hours. Similarly there is a substantial fall in instrumented hours worked for self-employed workers in business, but only in the low demand season. We need to point out, however, that the sample is somewhat smaller in the high season.